

### Summary

The invention relates to thermal energy transformers and a method for their efficiency enhancement. The method is based on the thermodynamic phase transformation of some solid material in a very narrow temperature spread, e.g. the shape-memory effect (SME) or the magneto-caloric effect (MCE). The material properties are changed along the axis of the heat flow in order to firmly adjust a gradient-like shift of the transformation temperature and the partial segments with higher transformation temperatures are arranged at the hot side and those with lower transformation temperatures at the cold side and staggered linear or as finely as possible. Thermal vibration in the range of the material-conditioned hysteresis facilitates an efficiency enhancement compared to cyclic gas processes through heat recovery between the individual segments, the larger ratio between operating temperature range and transformation hysteresis. Tube segments 1a - 1f of slightly different SME metal alloys on the basis of NiTi (nitinol) are lined up beside each other and are capable of operating water pumps with solar energy or waste heat from cooling processes. Magnetic flow changes can be excited in layer stacks of ferromagnetic alloys (e.g. MnFeAsP) and used for the induction of electrical energy proportionally to the heat flow.

(Figure 3)